

Evaluation of the Value of Using Simple Elastic Abdominal Binder during Colonoscopy

Mohie Eldin Mohamed Amer, Fatma Ahmed Younis, Abdel Rahman Abuelela Hassan*

Department of Gastroenterology, Liver & Infectious Diseases, Faculty of Medicine,
Al-Azhar University, Cairo, Egypt

*Corresponding author: Abdel Rahman Abuelela Hassan; Mobile: (+20) 1092777902; email: abdelrahman4u@gmail.com

ABSTRACT

Background: Colonoscopy is the most sensitive and specific means for examining the colon, particularly for the diagnosis of colon cancers and polyps.

Objective: The goal of our study was to evaluate the use of simple elastic abdominal binder during colonoscopy and its outcome on the ease, safety and success of the procedure.

Patients and methods: This prospective study included a total of 120 patients who were scheduled to undergo elective colonoscopy for evaluating the value of application of elastic abdominal binder during colonoscopy, attending at Endoscopy Unit AL-Hussein University Hospital. This study was conducted between April 2018 to August 2019. The included subjects were randomly divided into two groups; **Group 1** consisted of 60 patients underwent colonoscopy with use of abdominal binder (AB), **Group 2** consisted of 60 patients underwent colonoscopy without use of AB.

Results: showed that the commonest indication for colonoscopy was chronic constipation in 32 cases (26.6%) then bleeding per rectum in 30 cases (25%) with no significant differences between the studied groups. Hypertension (HTN) was the commonest co-morbidities of all 103 studied patients with no significant differences between the studied groups. Duration of procedure (cecal intubation) was less with use of abdominal binder. Patient repositioning was less frequent with use of abdominal binder during colonoscopy.

Conclusion: It could be concluded that abdominal binder provides some benefits and help endoscopist to achieve high quality colonoscopy in shorter duration with higher rates of cecal intubation and lower rates of repositioning of patients.

Keywords: Evaluation of the Value of Using Simple Elastic Abdominal Binder, Colonoscopy.

INTRODUCTION

Colonoscopy is a well-established endoscopic procedure widely used for screening, diagnosis, and treatment.

Colonoscopy is the endoscopic examination of the large bowel and the distal part of the small bowel with a charge-coupled device (CCD) camera or a fiber optic camera on a flexible tube passed through the anus. It can provide a visual diagnosis (e.g., ulceration, polyps) and grants the opportunity for biopsy or removal of suspected colorectal cancer lesions⁽¹⁾.

Inspection of the lower gastrointestinal tract dates back to simple anal and rectal specula found in the ruins of Pompei. The majority of advances beyond that, however, did not come until after the advances in fiber-optic upper endoscopy instruments⁽²⁾.

Colonoscope technology continues to evolve. Changes that effect function in a way that will allow for more frequent cecal intubation, quicker time to cecum, or less pain include scope diameter and the capability to vary the stiffness of the scope. One obstacle that must be overcome during this procedure is looping of the colonoscope shaft. Looping occurs in up to 90% of all colonoscopies⁽³⁾.

Looping can have a variety of effects ranging from extended procedure times, incomplete examinations, or even perforation of the colon wall

and splenic injury. It also increases pain and discomfort for the patient⁽⁴⁾.

There are some devices being used in the medical field to combat the problem of looping during the colonoscopy procedure. Each has had varying degrees of success, namely; computer-assisted colonoscopy using shape-locking guide, colonoscope over-tube, and magnetic endoscopic imaging⁽¹⁾.

Ancillary maneuvers such as abdominal pressure and patient position change are often employed to correct looping, yet these maneuvers are applied variably, require extra personnel, are incompletely successful, and can increase procedure time and cost⁽⁵⁾.

Manual application of abdominal pressure (generally by a technician or nurse, even self-administered by the patient) is the most frequently used ancillary maneuver during colonoscopies, yet this is largely an unscientific and unregimented practice⁽⁶⁾.

Crockett *et al.*⁽⁷⁾, developed the ColoWrap[®] which is a non-invasive abdominal compression device designed to prevent and reduce looping during the insertion phase of colonoscopy. They noticed that ColoWrap appears to be safe and could reduce looping in a subgroup of patients undergoing colonoscopy. Furthermore, they concluded that their device appears to benefit

patients with body mass indices of 30–40, but further studies are needed ⁽⁸⁾.

The goal of the current study was to evaluate the use of simple elastic abdominal binder during colonoscopy and its outcome on the ease, safety and success of the procedure.

PATIENTS AND METHODS

This prospective study included a total of 120 patients who were scheduled to undergo elective colonoscopy for evaluating the value of application of elastic abdominal binder during colonoscopy, attending at Endoscopy Unit AL-Hussein University Hospital. This study was conducted between April 2018 to August 2019.

Ethical approval and written informed consent :
An approval of the study was obtained from Al-Azhar University academic and ethical committee. All patients signed an informed written consent before the procedures, after receiving an explanation of the risks, benefits and alternatives of colonoscopy and associated therapeutic procedures.

The included subjects were randomly divided into two groups; **Group 1** consisted of 60 patients underwent colonoscopy with use of abdominal binder (AB), **Group 2** consisted of 60 patients underwent colonoscopy without use of AB.

Exclusion criteria:

1. Patients refused to undergo the procedure or to sign consent.
- 2- Age younger than 18 years.
- 3- Patients with history of colonic surgery.

All patients were subjected to:

Full history taking including epidemiological data, symptoms as jaundice, abdominal pain, fever and previous abdominal surgery, hemorrhagic diathesis, diarrhea, constipation or co-morbid conditions such as liver disease, ischemic heart or renal impairment diabetes mellitus and hypertension.

Investigations:

Complete blood picture (CBC), prothrombin time (PT) partial thromboplastin time (PTT), liver function tests (AST, ALT, total bilirubin, direct

bilirubin, Alkaline phosphatase, gamma-glutamyl transferase and Albumin), renal function tests (creatinine and urea), electrolytes and abdominal ultrasound.

Colonoscopy was performed under sedation with the patient in the left-lateral position. During the procedure, all endoscopic data were reported, and any adverse event or complications occurred were documented in a colonoscopy data sheet that was designed for all patients undergoing the procedure.

All cases were evaluated (with the help of a computer) regarding age, gender, clinical and routine laboratory, abdominal sonography and any additional findings obtained during colonoscopy. Data entry and statistical analysis were performed using the statistical package for social science, version 20. Independent –samples test of significance was used when comparing between tow means. X²-test of significance was used to compare proportion between tow qualitative parameters.

Statistical analysis

Recorded data were analyzed using the statistical package for social sciences, version 20.0 (SPSS Inc., Chicago, Illinois, USA). Quantitative data were expressed as mean± standard deviation (SD). Qualitative data were expressed as frequency and percentage.

The following tests were done:

- Independent-samples t-test of significance was used when comparing between two means.
- Chi-square (x²) test of significance was used in order to compare proportions between two qualitative parameters.
- The confidence interval was set to 95% and the margin of error accepted was set to 5%. The p-value was considered significant as the following:
- Probability (P-value)
 - P-value <0.05 was considered significant.
 - P-value <0.001 was considered as highly significant.
 - P-value >0.05 was considered insignificant.

RESULTS

Table (1): Comparison between studied groups regarding demographic data:

		Group I (No.=60)		Group II (No.=60)		Chi square test	
		No	%	No	%	X ² /t*	P value
Gender	Male	29	48.3%	34	56.7%	0.835	0.361
	Female	31	51.7%	26	43.3%		
Age (year)	Mean ±SD	59.18 ± 9.50		51.71 ± 14.83		3.622	0.065

There were no statistically significant differences regarding demographic data between the studied groups.

Table (2): Comparison between studied groups regarding main indication of colonoscopy:

	Group I (No.=60)		Group II (No.=60)		Chi square test	
	No	%	No	%	X ²	P value
Chronic Constipation	17	28.3%	15	25%	0.170	0.680
Bleeding/ rectum	18	30%	12	20%	1.600	0.205
Chronic diarrhea	13	21.6%	15	25%	0.186	0.666
Persistent Abdominal pain with weight loss	9	15%	13	21.6%	0.891	0.345
Anemia& free upper endoscopy	3	5%	5	8%	0.536	0.464

The commonest indication was chronic constipation in 32 cases (26.6%) then bleeding per rectum in 30 cases (25%) with no significant differences between the studied groups.

Table (3): Comparison between studied groups regarding co-morbidity:

	Group I (No.=60)		Group II (No.=60)		Chi square test	
	No	%	No	%	X ²	P value
HTN	25	41.7%	30	50.0%	0.839	0.359
DM	20	33.3%	22	36.7%	0.147	0.701
Ischemic HD	18	30.0%	15	25.0%	0.376	0.539
Liver cirrhosis	12	20.0%	14	23.3%	0.196	0.657

There were no statistically significant differences regarding clinical picture; HTN was the commonest co-morbidities in both groups.

Table (4): Comparison between studied groups regarding endoscopic finding:

	Group I (No.=60)		Group II (No.=60)		Chi square test	
	No	%	No	%	X ²	P value
Normal	25	41.6%	22	36.6%	1.004	0.985
Erythematous colitis	11	18.3%	10	16.6%		
Polyp	5	8.3%	7	11.6%		
mass	3	5%	4	6.6%		
Diverticulosis	4	6.6%	5	8.3%		
Angiodysplasia	4	6.6%	5	8.3%		
Heamorrhd INT.	8	13.3%	7	11.6%		

There were no statistically significant differences regarding endoscopic finding between studied groups; normal colonoscopy was the commonest finding in 47 cases.

Table (5): Comparison between studied groups regarding successful cecal intubation (CI):

		Group I (No.=60)		Group II (No.=60)		Chi square test	
		No	%	No	%	X ²	P value
Successful CI	Successful	58	96.6%	50	83.3%	5.926	0.014
	Unsuccessful	2	3.3%	10	16.6%		

Successful cecal intubation was significantly increased in patients who underwent colonoscopy with use of abdominal binder (group I) in comparison to group II.

Table (6): Comparison between studied groups regarding repositioning of patients:

		Group I (No.=60)		Group II (No.=60)		Chi square test	
		No	%	No	%	X ²	P value
Reposition	Repositioning	6	10%	18	30%	7.500	0.006
	no repositioning	54	90%	42	70%		

Patients repositioning was significantly increased in patients who underwent colonoscopy without use of abdominal binder.

Table (7): Comparison between studied groups regarding manual pressure and duration of procedure:

		Group I (No.=60)		Group II (No.=60)		Chi square test	
		No	%	No	%	X ² /t*	P value
Manual pressure	Used	16	26.7%	27	45.0%	4.385	0.036
	Not used	44	73.3%	33	55.0%		
Duration	Mean \pm SD	8.11 \pm 1.91		9.21 \pm 2.11		0.249	0.034

Manual pressure was significantly increased in patients who underwent colonoscopy without use of abdominal binder. The duration of procedure was significantly increased in patients who underwent colonoscopy without use of abdominal binder.

DISCUSSION

Our aim in the current prospective study was to evaluate the potential and benefits of use of abdominal binder during colonoscopy regarding duration and completion of procedure cecal intubation. So, we examined outcomes and reporting serious adverse events in the studied groups carefully.

In our study, we used a fitted abdominal corset to exert pressure to prevent stretch of the mesentery and formation of sigmoid looping. This corset is inexpensive and easy to obtain. The 'classical solution' manual compression needs uninterrupted assistance and may result in uncontrolled applied pressure.

The fitted abdominal corset encircles the abdomen and exerts effective and well balanced pressure for the entire duration of the procedure without assistance. In the present study, without causing a bias in data, our assistant applied abdominal compression and change of position whenever needed in both groups with and without the abdominal corset.

The gender and age in the current study reveals no statistical significant difference between the studied groups, the results were in agreement with **Soo et al.**⁽⁹⁾.

The most common finding in two groups was normal colonoscopy in 25 cases in group I while in 22 cases in group II with no statistical difference regarding endoscopic findings between the studied groups; this was in agreement with **Özsoy et al.**⁽¹⁰⁾.

Our results also agree with **Fernández et al.**⁽¹¹⁾ who reported that the commonest finding was normal examination of colonoscopy in (32%) of patients then colitis and polyps.

In our study, the commonest indication for colonoscopy was chronic constipation in 32 cases (26.6%) bleeding per rectum in 30 cases (25%) with no significant differences between the studied groups; this were in agreement with **Triantafillidis et al.**⁽¹²⁾ and **Alatise et al.**⁽¹³⁾ who reported that chronic constipation was the commonest indication for colonoscopy.

It was shown that rate of complete procedure (cecal intubation) was higher in group I (96.6%) than group II (83.3%) which was statistically significant (p value =0.035); this results were in agreement with **Tsutsumi et al.**⁽¹⁴⁾ who evaluated the usefulness of an abdominal bandage for colonoscopy to keep the colonoscope straight in the sigmoid colon without looping throughout the examination.

Gkolfakis et al.⁽¹⁵⁾ also reported the use of abdominal bandage increases rate of cecal intubation and decreases the time needed to reach the caecum.

There was statistically significant increase in reposition of patients in group II (30%) in comparison to group I (10%) (P value=0.036), there was also increase of increase in use of manual pressure in group II than group I (p value=0.036) this was reported by **Allison et al.**⁽¹⁶⁾.

Our study showed that the mean duration for complete procedure from insertion of tip of the shaft of colonoscopy till cecal intubation was significantly less in group I 8.11 (\pm 1.91) than Group II 9.21(\pm 2.11), (P value= 0.034); this was in agreement with **Ahmet et al.**⁽¹⁷⁾ who reported that cecal intubation time was shorter, the need for extra manual compression and change of position decreased during the procedure in the group using a fitted abdominal corset, when compared to the group without a corset.

We also agree with **Hansel et al.**⁽⁵⁾ who reported that cecal intubation time was shorter, need for extra manual compression and change of position decreased in the group using a fitted abdominal corset, when compared to the group without a corset.

Yörük et al.⁽¹⁸⁾ reported that abdominal binder provided a faster and more effective colonoscopy, as it significantly reduced the time needed for insertion, frequency of changes in position and abdominal manual pressure, and the degree of abdominal distention after colonoscopy.

Using an abdominal bandage was also reported to be more effective compared with traditional methods to reduce the degree of pain⁽⁸⁾.

The possible reduction in need for manual pressure and patient positioning has implications not only for patient comfort, but also for endoscopy unit staffing and procedural costs, given that extra personnel are often required to perform these maneuvers⁽¹⁹⁾.

An abdominal compression device (ColoWrap) has been developed for this purpose **Jason et al.**⁽²⁰⁾. ColoWrap is a noninvasive abdominal compression device designed to prevent and reduce looping during the insertion phase of colonoscopy.

Catalano et al.⁽²¹⁾ developed an external straightener device that enabled compression of the abdomen during colonoscopy. This apparatus was successful at reducing cecal intubation and decreasing the pain reported by patients undergoing the procedure⁽²²⁾.

However, increasing the use of sedation and analgesia for comfortable colonoscopy would make it difficult to apply these ancillary techniques to aid in colonoscope insertion. Unlike manual abdominal pressure or postural change, abdominal binder generally provides effective pressure to assist insertion without the help of assistants or patients themselves⁽²³⁾.

Toros *et al.*⁽²⁴⁾ found that the use of an abdominal binder reduced patient-reported pain at a statistically significant level. There was, however, no significant difference in cecal intubation rate between groups.

Jamie *et al.*⁽²²⁾ reported that using an abdominal binder was also reported to be more effective compared with traditional methods to reduce the degree of pain.

CONCLUSIONS

Many assistive aids were developed to overcome obstacles of colonoscopy; one of them is use of elastic abdominal binder which is cheap, affordable, and easy to apply around abdomen.

In our study it has been found that abdominal binder provides some benefits and help endoscopist to achieve high quality colonoscopy in shorter duration with higher rates of cecal intubation and lower rates of repositioning of patients.

RECOMMENDATIONS

Results of this study support the use of elastic abdominal binder during colonoscopy, as its beneficial effects on completion of procedure in shorter duration, more comfort for the patient and less staff needed for manual pressure and reposition of the patient.

REFERENCES

- Bruce M and Choi J (2018):** Detection of endoscopic looping during colonoscopy procedure by using embedded bending sensors. *Med Devices (Auckl)*, 11:171-191.
- Edmonson JM (1991):** History of the instruments for gastrointestinal endoscopy. *Gastrointest Endosc.*, 37(2):S27-S56.
- Hsu C, Lin W, Su M *et al.* (2012):** Factors that influence cecal intubation rate during colonoscopy in deeply sedated patients. *J. Gastroenterol Hepatol.*, 27:76-80.
- Shankar S, Rowe S (2011):** Splenic injury after colonoscopy: case report and review of literature. *Ochsner J Fall.*, 11(3):276-81.
- Hansel S, Prechel A, Horn B *et al.* (2009):** Observational study of the frequency of use and perceived usefulness of ancillary manoeuvres to facilitate colonoscopy completion. *Dig Liver Dis.*, 41 (11): 812-816.
- Hsieh H, Lin J, Tseng C *et al.* (2011):** Limited water infusion decreases pain during minimally sedated colonoscopy. *World J Gastroenterol.*, 17:2236-48.
- Crockett SD, Cirri HO, Kelapure R *et al.* (2016):** Use of an abdominal compression device in colonoscopy: a randomized, sham-controlled trial. *Clin Gastroenterol Hepatol.*, 14:850-7.
- Seth S (2012):** Evaluating the Patient with Diarrhea: A Case-Based Approach. *Mayo Clin Proc.*, 87 (6): 596-602.
- Soo Hoo GW, Santiago S, Williams AJ (1994):** Nasal mechanical ventilation for hypercapnic respiratory failure in chronic obstructive pulmonary disease: determinants of success and failure. *Crit Care Med.*, 22:1253-1261.
- Özsoy M, Celep B, Ersen O *et al.* (2004):** Our results of lower gastrointestinal endoscopy: evaluation of 700 patients. *Ulus Cerrahi Derg.*, 30(2):71-75.
- Fernández E, Linares A, Alonso J *et al.* (1996):** Colonoscopic findings in patients with lower gastrointestinal bleeding send to a hospital for their study. Value of clinical data in predicting normal or pathological findings. *Rev Esp Enferm Dig.*, 88(1): 16-25.
- Triantafyllidis J, Merikas E, Nikolakis D *et al.* (2013):** Sedation in gastrointestinal endoscopy: current issues. *World J Gastroenterol.*, 19(4):463-81.
- Alatise O, Arigbabu A, Agbakwuru E *et al.* (2012):** Spectrum of colonoscopy findings in Ile-Ife Nigeria. *Niger Postgrad Med J.*, 19(4): 219-224.
- Tsutsumi S, Haruo F, Hiroyuki K *et al.* (2007):** Colonoscopy using an abdominal bandage. *Hepatogastroenterology*, 54(79): 1983-1984.
- Gkolfakis P, Tziatzios G, Dimitriadis GD *et al.* (2017):** New endoscopes and add-on devices to improve colonoscopy performance. *World J Gastroenterol.*, 23(21):3784-3796.
- Allison R, Marvin R, Walter W (2017):** A Novel Hands-Free Abdominal Compression Device for Colonoscopy Significantly Decreases Cecal Intubation Time: A Prospective Single-Blinded Pilot Study. <https://www.liebertpub.com/doi/abs/10.1089/lap.2016.0649>
- Ahmet B, Feyzullah E, Ozcan O (2012):** Does a fitted abdominal corset make colonoscopy more tolerable?. *Digestive Endoscopy*, 24: 164-167.
- Yörük G, Aksöz K, Ünsal B *et al.* (2003):** "Colonoscopy without sedation." *Turk J Gastroenterol.*, 14:59-63.
- Liao C, Appannagari A, Mangla S, *et al.* (2014):** Risk factors for inadequate colonoscopy bowel preparations in African Americans and whites at an urban medical center. *South Med J.*, 107(4):220-4.
- Jason A, Dominitz JA, Neradilek M *et al.* (2014):** Determination of colonoscopy indication from administrative claims data. *Med Care*, 52(4):21-9.
- Catalano F, Catanzaro R, Branciforte G *et al.* (2000):** Colonoscopy technique with an external straightener. *Gastrointest Endosc.*, 51(5):600-4.
- Jamie L, Gustafson A, Jennifer D *et al.* (2018):** Elastic Abdominal Binders Reduce Cesarean Pain Postoperatively: A Randomized Controlled Pilot Trial. *Kansas Journal of Medicine*, 11: 1-19.
- Takahashi Y, Tanaka H, Kinjo M *et al.* (2005):** Prospective evaluation of factors predicting difficulty and pain during sedation-free colonoscopy. *Dis Colon Rectum*, 48(6):1295-300.
- Toros A, Ersoz F, Ozcan O *et al.* (2012):** Does a fitted abdominal corset make colonoscopy more tolerable? *Dig Endosc.*, 24:164-7.